## Parameter Overview

May 15, 2020

## Introduction

This file contains the parameters we tuned for each specific algorithm. All parameters, which we changed from the default values, are listed.

The provided datasets (rosbags) can be downloaded here:

## Scenario\_1

## Scenario\_2

The necessary transformations from camera image / camera imu to robot base are provided via broad.py. Due to the fact that some algorithms require these transformations within a distinct time, we did not use the tf topic to provide this data.

For more information: README

MaxDepth   15		Method	Parameters	Values
MaxDepthDiff   0.05			MaxDepth	15
MaxPointsPart   0.005		RGBDOdometry	MinDepth	0.3
COMPAND   COMP			MaxDepthDiff	0.05
DVO			MaxPointsPart	0.05
DVO			coarsest_level	5
DVO			${ m finest\_level}$	1
Influence function_param use weighting use weighting use weighting scale_estimator_param   1			$\max_{i}$ iterations	300
Intluence_Linction_param   30     use_weighting   truc     scale_cestimator_param   1     precision   0.0005     fast_threshold   15     max_pyramid_level   4     fast_threshold_adaptive_gain   0.005     feature_window.size   10     MaxDepth   15     MinDepth   0.3     MaxDepth   0.25     MaxDepth   5     MaxDepth   5     MaxDepth   0.3     MaxDepth		DVO	$influence\_function$	2
Scale_estimator_param   1		DVO	influence_function_param	30
Precision   15			use_weighting	true
Fovis			$scale\_estimator\_param$	1
Fovis         max.pyramid.level         4           fast.threshold.adaptive.gain         0.005           feature.window.size         10           MaxDepth         15           MinDepth         0.3           MaxPointsPart         0.03           MaxDepth         5           MaxDepth         0.3           MaxDepth         0.3           MaxDepthlif         0.35           MaxDepthlif         0.35           MaxDepthlif         0.35           MaxDepthlif         0.3           MaxDepthlif         0.0			precision	0.0005
Fovis   fast.threshold_adaptive_gain   0.005   feature_window_size   10			fast_threshold	15
Task.threshold.adaptive.gam   10		Fovis	max_pyramid_level	4
MaxDepth			fast_threshold_adaptive_gain	0.005
ICPOdometry         MinDepth MaxPepthDiff         0.25           MaxPointsPart         0.03           MaxPointsPart         0.03           MaxDepth         5           MinDepth         0.3           MaxPointsPart         0.08           MaxPointsPart         0.08           MaxPointsPart         0.08           CCNY         feature/detector_type         ORB           feature/max_range         15.0           reg/ICPProbModel/max_model.size         10000           reg/ICPProbModel/max_model.size         12           reg/ICPProbModel/max_corresp.dist_eucl         0.05           reg/ICPProbModel/max_corresp.dist_eucl         0.05           tracking/coarsest_level         5           tracking/max_iterations         300           tracking/max_iterations         30           tracking/max_iterations         30           tracking/max_iterations         30           tracking/precision         0.0005           slam/max_rotational_distance         0.3           slam/constraint_min_entropy_ratio_coarse         0.7           slam/constraint_min_entropy_ratio_coarse         0.7           slam/constraint_min_entropy_ratio_fine         0.8           RTABMap			feature_window_size	10
ICPOdometry         MinDepth (MaxPepthDiff)         0.25           MaxPointsPart         0.03           MaxDepth         5           MaxDepth         5           MinDepth         0.35           MaxPointsPart         0.08           CCNY         Feature/detector.type (Feature/max.range)         15.0           reg/ICPProbModel/max.model.size         10000           reg/ICPProbModel/min.correspondences         12           reg/ICPProbModel/max.assoc.dist.mah         13           reg/ICPProbModel/max.assoc.dist.mah         13           reg/ICPProbModel/max.corresp.dist.eucl         0.05           tracking/coarsest.level         5           tracking/max.iterations         300           tracking/max.iterations         300           tracking/scale.estimator.param         1           tracking/jiffuence.function.param         30           tracking/precision         0.0005           slam/max.rotational distance         0.3           slam/constraint.min.entropy.ratio         0.3           slam/constraint.min.entropy.ratio         0.8           RTABMap         -         -           Camera.fx         927.7444458007812           Camera.fy         655.3325805664062		ICPOdometry	MaxDepth	15
MaxPointsPart   0.03				0.3
MaxDepth         5           MinDepth         0.3           MaxDepthDiff         0.35           MaxPointsPart         0.08           feature/detector.type         ORB           feature/max_range         15.0           reg/ICPProbModel/max_model.size         10000           reg/ICPProbModel/min_correspondences         12           reg/ICPProbModel/max_assoc_dist_mah         13           reg/ICPProbModel/max_corresp_dist_eucl         0.05           tracking/coarsest_level         5           tracking/finest_level         1           tracking/finest_level         1           tracking/max_iterations         300           tracking/max_iterations         300           tracking/max_iterations         30           tracking/max_iterations         30           tracking/max_iterations         0.0           slam/constraint_min_entropy_ratio         0.3           slam/max_rotational_distance         0.3           slam/constraint_min_entropy_ratio_coarse         0.7           slam/constraint_min_entropy_ratio_coarse         0.7           slam/constraint_min_entropy_ratio_coarse         0.7           clamera_ck         655.3325805664062           Camera_ck				0.25
MinDepth         0.3           MaxDepthDiff         0.35           MaxPointsPart         0.08           MaxPointsPart         0.08           MaxPointsPart         0.08           Feature/detector_type         ORB           feature/max_range         15.0           reg/ICPProbModel/max_model_size         10000           reg/ICPProbModel/max_model_size         10000           reg/ICPProbModel/max_assoc_dist_maln         13           reg/ICProbModel/max_assoc_dist_maln         13           reg/ICProbModel/max_assoc_dist_maln         13           reg/ICProbModel/max_a			MaxPointsPart	0.03
MaxDepthDiff         0.35           MaxPointsPart         0.08           Feature/detector-type         ORB           feature/max_range         15.0           reg/ICPProbModel/max_model_size         10000           reg/ICPProbModel/min_correspondences         12           reg/ICPProbModel/max_assoc_dist_mah         13           reg/ICPProbModel/max_assoc_dist_mah         13           reg/ICPProbModel/max_corresp_dist_eucl         0.05           tracking/coarsest_level         5           tracking/finest_level         1           tracking/finest_level         1           tracking/finest_level         1           tracking/scale_estimator_param         1           tracking/scale_estimator_param         1           tracking/influence_function_param         30           tracking/precision         0.0005           slam/max_rotational_distance         0.3           slam/constraint_min_entropy_ratio         0.3           slam/constraint_min_entropy_ratio_coarse         0.7           slam/constraint_min_entropy_ratio_fine         0.8           RTABMap         -         -           Camera.fx         927.7444458007812           Camera.fy         928.2129516601562			MaxDepth	5
MaxDepthDiff         0.35           MaxPointsPart         0.08           Feature/detector.type         ORB           feature/max_range         15.0           reg/ICPProbModel/max_model.size         10000           reg/ICPProbModel/min_correspondences         12           reg/ICPProbModel/max_assoc.dist_mah         13           reg/ICPProbModel/max_corresp_dist_eucl         0.05           tracking/coarsest_level         1           tracking/finest_level         0           tracking/finest_level         0           tracking/finest_level         0           tracking/finest_level		RgbdICPOdometry	MinDepth	0.3
MaxPointsPart   0.08				0.35
CCNY         feature/max.range reg/ICPProbModel/max.model.size reg/ICPProbModel/min.correspondences reg/ICPProbModel/min.correspondences reg/ICPProbModel/min.correspondences reg/ICPProbModel/min.correspondences reg/ICPProbModel/max.assoc.dist.mah 13 reg/ICPProbModel/max.corresp.dist.eucl 0.05           Tracking/Coarsest.level tracking/finest.level 1 tracking/finest.level 1 tracking/max.iterations 300         300           Tracking/scale_estimator.param 1 tracking/influence.function.param 30         1           Tracking/mu 0         0.0005           Slam/min.entropy.ratio 0.3 slam/constraint.min.entropy.ratio 0.3         0.3           Slam/constraint.min.entropy.ratio.coarse slam/constraint.min.entropy.ratio.fine 0.8         0.7           RTABMap         -         -           RTABMap         -         -           Camera.fx         927.74444458007812         0.8           Camera.fx         928.2129516601562         0.2           Camera.cy         655.3325805664062         0.2           Camera.width         1280         1280           Camera.bight         720         0           Camera.bight         720         0           ORBextractor.miThFAST         6         0           ORBextractor.miThFAST         6         0           ORBextractor.nlevels         8           ORBextractor.nlevels         2500 <td>• • • • • • • • • • • • • • • • • • •</td> <td>0.08</td>			• • • • • • • • • • • • • • • • • • •	0.08
CCNY         feature/max.range reg/ICPProbModel/max.model.size reg/ICPProbModel/min.correspondences reg/ICPProbModel/min.correspondences reg/ICPProbModel/min.correspondences reg/ICPProbModel/min.correspondences reg/ICPProbModel/max.assoc.dist.mah 13 reg/ICPProbModel/max.corresp.dist.eucl 0.05           Tracking/Coarsest.level tracking/finest.level 1 tracking/finest.level 1 tracking/max.iterations 300         300           Tracking/scale_estimator.param 1 tracking/influence.function.param 30         1           Tracking/mu 0         0.0005           Slam/min.entropy.ratio 0.3 slam/constraint.min.entropy.ratio 0.3         0.3           Slam/constraint.min.entropy.ratio.coarse slam/constraint.min.entropy.ratio.fine 0.8         0.7           RTABMap         -         -           RTABMap         -         -           Camera.fx         927.74444458007812         0.8           Camera.fx         928.2129516601562         0.2           Camera.cy         655.3325805664062         0.2           Camera.width         1280         1280           Camera.bight         720         0           Camera.bight         720         0           ORBextractor.miThFAST         6         0           ORBextractor.miThFAST         6         0           ORBextractor.nlevels         8           ORBextractor.nlevels         2500 <td></td> <td rowspan="7">CCNY</td> <td>feature/detector_type</td> <td>ORB</td>		CCNY	feature/detector_type	ORB
CCNY         reg/ICPProbModel/max.model.size reg/ICPProbModel/min_correspondences reg/ICPProbModel/n_nearest_neighbors 20 reg/ICPProbModel/max_assoc_dist_mah 13 reg/ICPProbModel/max_corresp_dist_eucl 0.05           Tracking/Coarsest_level 5 tracking/finest_level 5 tracking/finest_level 1 tracking/max_iterations 300         1           DVOSLAM         tracking/scale_estimator_param 1 tracking/influence function_param 30 tracking/mu 0 tracking/mu 0 slam/max_rotational_distance slam/min_entropy_ratio 0.3 slam/constraint_search_radius 0.6 slam/constraint_min_entropy_ratio 0.3 slam/constraint_min_entropy_ratio fine 0.8           RTABMap         -           Camera.fx         927.7444458007812 Camera.cx 655.3325805664062 Camera.cx 655.3325805664062 Camera.cx 655.3325805664062 Camera.cy 361.226318359375 Camera.width 1280 Camera.height 720 Camera.height 720 Camera.height 720 Camera.bf 13.640315374 ORBextractor.scaleFactor 1.25 ORBextractor.minThFAST 6 ORBextractor.minThFAST 6 ORBextractor.minThFAST 8           ORBextractor.minThFAST 6 ORBextractor.nlevels 8 ORBextractor.nLevels 8           ORBextractor.nFeatures 2500				15.0
CCNY         reg/ICPProbModel/min_correspondences reg/ICPProbModel/n_nearest_neighbors reg/ICPProbModel/max_assoc_dist_mah reg/ICPProbModel/max_assoc_dist_mah reg/ICPProbModel/max_assoc_dist_mah reg/ICPProbModel/max_corresp_dist_eucl         13           Language of tracking/coarsest_level tracking/finest_level         5           Language tracking/finest_level         1           Language tracking/max_iterations         300           Language tracking/scale_estimator_param tracking/influence_function_param tracking/mu         0           DVOSLAM         tracking/precision         0.0005           Slam/max_rotational_distance slam/max_rotational_distance         0.3           Slam/constraint_search_radius         0.6           Slam/constraint_min_entropy_ratio_coarse slam/constraint_min_entropy_ratio_fine         0.8           RTABMap         -           Camera.fx         927.7444458007812           Camera.fy         928.2129516601562           Camera.cy         361.226318359375           Camera.cy         361.226318359375           Camera.beight         720           Camera.beight         720           Camera.beight         720           ORBextractor.scaleFactor         1.25           ORBextractor.minThFAST         6           ORBextractor.minThFAST         6           ORBextractor.n				10000
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reg/ICPProbModel/max_assoc_dist_mah reg/ICPProbModel/max_corresp_dist_eucl   0.05     tracking/coarsest_level   5     tracking/finest_level   1     tracking/max_iterations   300     tracking/max_iterations   300     tracking/influence_function_param   1     tracking/influence_function_param   30     tracking/mu   0     tracking/mu   0     tracking/mu   0     tracking/precision   0.0005     slam/max_rotational_distance   0.3     slam/constraint_min_entropy_ratio   0.3     slam/constraint_min_entropy_ratio_coarse   0.7     slam/constraint_min_entropy_ratio_fine   0.8      RTABMap   -				20
reg/ICPProbModel/max_corresp_dist_eucl				13
tracking/coarsest_level				0.05
tracking/max_iterations         300           tracking/scale_estimator_param         1           tracking/influence_function_param         30           DVOSLAM         tracking/mu         0           tracking/precision         0.0005           slam/max_rotational_distance         0.3           slam/constraint_min_entropy_ratio         0.6           slam/constraint_min_entropy_ratio_coarse         0.7           slam/constraint_min_entropy_ratio_fine         0.8           RTABMap         -         -           Camera.fx         927.7444458007812           Camera.fy         928.2129516601562           Camera.cx         655.3325805664062           Camera.cy         361.226318359375           Camera.width         1280           Camera.height         720           Camera.bf         13.640315374           ORBextractor.scaleFactor         1.25           ORBextractor.iniThFAST         20           ORBextractor.minThFAST         6           ORBextractor.nLevels         8           ORBextractor.nFeatures         2500			· · · · · · · · · · · · · · · · · · ·	5
tracking/max_iterations         300           tracking/scale_estimator_param         1           tracking/influence_function_param         30           DVOSLAM         tracking/mu         0           tracking/precision         0.0005           slam/max_rotational_distance         0.3           slam/constraint_min_entropy_ratio         0.6           slam/constraint_min_entropy_ratio_coarse         0.7           slam/constraint_min_entropy_ratio_fine         0.8           RTABMap         -         -           Camera.fx         927.7444458007812           Camera.fy         928.2129516601562           Camera.cx         655.3325805664062           Camera.cy         361.226318359375           Camera.width         1280           Camera.height         720           Camera.bf         13.640315374           ORBextractor.scaleFactor         1.25           ORBextractor.iniThFAST         20           ORBextractor.minThFAST         6           ORBextractor.nLevels         8           ORBextractor.nFeatures         2500			tracking/finest_level	1
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DVOSLAM         tracking/influence_function_param         30           tracking/mu         0           tracking/precision         0.0005           slam/max_rotational_distance         0.3           slam/constraint_search_radius         0.6           slam/constraint_min_entropy_ratio_coarse         0.7           slam/constraint_min_entropy_ratio_fine         0.8           RTABMap         -           Camera.fx         927.7444458007812           Camera.fy         928.2129516601562           Camera.cx         655.3325805664062           Camera.width         1280           Camera.width         1280           Camera.bf         13.640315374           ORBextractor.scaleFactor         1.25           ORBextractor.iniThFAST         20           ORBextractor.minThFAST         6           ORBextractor.nLevels         8           ORBextractor.nFeatures         2500				1
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tracking/precision			-·	0
Slam/min_entropy_ratio			tracking/precision	0.0005
Slam/min_entropy_ratio			slam/max_rotational_distance	0.3
Slam/constraint_search_radius   0.6     slam/constraint_min_entropy_ratio_coarse   0.7     slam/constraint_min_entropy_ratio_fine   0.8     RTABMap			· · · · · · · · · · · · · · · · · · ·	0.3
slam/constraint_min_entropy_ratio_fine         0.8           RTABMap         -         -           Camera.fx         927.7444458007812           Camera.fy         928.2129516601562           Camera.cx         655.3325805664062           Camera.cy         361.226318359375           Camera.width         1280           Camera.height         720           Camera.bf         13.640315374           ORBextractor.scaleFactor         1.25           ORBextractor.iniThFAST         20           ORBextractor.minThFAST         6           ORBextractor.nLevels         8           ORBextractor.nFeatures         2500				0.6
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Camera.fx         927.7444458007812           Camera.fy         928.2129516601562           Camera.cx         655.3325805664062           Camera.cy         361.226318359375           Camera.width         1280           Camera.height         720           Camera.bf         13.640315374           ORBextractor.scaleFactor         1.25           ORBextractor.iniThFAST         20           ORBextractor.minThFAST         6           ORBextractor.nLevels         8           ORBextractor.nFeatures         2500			slam/constraint_min_entropy_ratio_fine	0.8
$ \begin{array}{c} Camera.fy & 928.2129516601562 \\ Camera.cx & 655.3325805664062 \\ Camera.cy & 361.226318359375 \\ Camera.width & 1280 \\ Camera.height & 720 \\ Camera.bf & 13.640315374 \\ ORBextractor.scaleFactor & 1.25 \\ ORBextractor.iniThFAST & 20 \\ ORBextractor.minThFAST & 6 \\ ORBextractor.nLevels & 8 \\ ORBextractor.nFeatures & 2500 \\ \end{array} $		RTABMap	<del>-</del>	-
$ \begin{array}{c} Camera.cx & 655.3325805664062 \\ Camera.cy & 361.226318359375 \\ Camera.width & 1280 \\ Camera.height & 720 \\ Camera.bf & 13.640315374 \\ ORBextractor.scaleFactor & 1.25 \\ ORBextractor.iniThFAST & 20 \\ ORBextractor.minThFAST & 6 \\ ORBextractor.nLevels & 8 \\ ORBextractor.nFeatures & 2500 \\ \end{array} $		ORB-SLAM2	Camera.fx	927.7444458007812
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			Camera.fy	928.2129516601562
$ORB-SLAM2 \begin{tabular}{lll} $Camera.width & 1280 \\ $Camera.height & 720 \\ $Camera.bf & 13.640315374 \\ \hline ORBextractor.scaleFactor & 1.25 \\ \hline ORBextractor.iniThFAST & 20 \\ ORBextractor.minThFAST & 6 \\ \hline ORBextractor.nLevels & 8 \\ ORBextractor.nFeatures & 2500 \\ \hline \end{tabular}$			Camera.cx	655.3325805664062
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			Camera.cy	361.226318359375
$\begin{array}{c} \text{ORB-SLAM2} \\ \text{ORBextractor.scaleFactor} \\ \text{ORBextractor.iniThFAST} \\ \text{ORBextractor.minThFAST} \\ \text{ORBextractor.minThFAST} \\ \text{ORBextractor.nLevels} \\ \text{ORBextractor.nFeatures} \\ \text{ORBextractor.nFeatures} \\ \end{array}$			· · · · · · · · · · · · · · · · · · ·	1280
Camera.bf       13.640315374         ORBextractor.scaleFactor       1.25         ORBextractor.iniThFAST       20         ORBextractor.minThFAST       6         ORBextractor.nLevels       8         ORBextractor.nFeatures       2500			Camera.height	720
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ORBextractor.minThFAST 6 ORBextractor.nLevels 8 ORBextractor.nFeatures 2500			ORBextractor.scaleFactor	1.25
ORBextractor.nLevels 8 ORBextractor.nFeatures 2500				20
ORBextractor.nFeatures 2500				
			ORBextractor.nLevels	
config/nn_distance_ratio 0.5			ORBextractor.nFeatures	2500
		DODDOLAM A	config/nn_distance_ratio	0.5